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Claims

[c1] A compass system comprising:
a platform defining an x-axis, a y-axis and an xy-plane, wherein a z-axis is orthogonal to said xy-plane;
a beam rotatably coupled to said platform such that said beam rotates about said y-axis;
an accelerometer comprising a flexure plate perpendicular to said y-axis, said accelerometer coupled to said beam a distance from said y-axis, said accelerometer generating an accelerometer signal in response to movement of said flexure plate;
an angular position sensor sensing angular position of said beam relative to said x-axis and said y-axis within said xy-plane, said angular position sensor generating an angular position signal therefrom; and
a processor receiving said accelerometer signal and said angular position signal, said processor generating an East-West signal therefrom.

[c2] The system of claim 1, wherein said beam rotates at a constant velocity or a variable velocity.

[c3] The system of claim 1, wherein said angular position sensor comprises a synchro, a resolver, or a shaft angle

reader reading a position of said platform and generating an angular reference output signal therefrom.

[c4] The system of claim 1, wherein said processor levels said platform with respect to local earth gravity.

[c5] The system of claim 1, wherein said processor rotates said beam such that said accelerometer reads a sum of a velocity of said accelerometer and a rotation of the earth.

[c6] The system of claim 5, wherein said processor generates a sinusoidal signal of a rotating acceleration of said accelerometer due to said sum of said velocity of said accelerometer and said rotation of the earth.

[c7] The system of claim 6, wherein said processor reads a positive peak and a negative peak within said sinusoidal signal.

[c8] The system of claim 7, wherein said processor generates an earth rate direction signal in response to said positive peak and said negative peak, and wherein said East-West signal is generated from said earth rate direction signal.

[c9] The system of claim 1 further comprising an actuator activating a system component in response to said platform control signal, wherein said system component comprises a thruster or an attitude control device.

[c10] The system of claim 1, wherein said accelerometer comprises a dual bridge accelerometer or a flexure plate accelerometer.

[c11] A method for operating a compass system on the earth comprising:
leveling a platform with respect to local earth gravity;
rotating a flexure plate bridge accelerometer perpendicular to said platform such that said flexure plate bridge accelerometer reads a sum of a velocity of said accelerometer and a rotation of the earth as said flexure plate bridge accelerometer is rotated about a y-axis and said platform is rotated about a z-axis;
generating a sinusoidal signal of a rotating acceleration of said flexure plate bridge accelerometer due to said sum of said velocity of said accelerometer and said rotation of the earth;
reading a positive peak and a negative peak within said sinusoidal signal; and
generating an earth rate direction signal in response to said positive peak and said negative peak.

[c12] The method of claim 11 further rotating said flexure plate bridge accelerometer at a constant velocity and at a distance from a pivot coupled to said platform.

[c13] The method of claim 11, wherein generating an earth rate direction signal further comprises storing a current angular position of said flexure plate bridge accelerometer in response to a current radial acceleration greater than a previous radial acceleration.

[c14] The method of claim 11, wherein generating an earth rate direction signal further comprises storing a current angular position of said flexure plate bridge accelerometer in response to a current radial acceleration less than a previous radial acceleration.

[c15] The method of claim 11, wherein generating an earth rate direction signal further comprises determining a stability of the system.

[c16] The method of claim 11, wherein generating a maximum sinusoidal signal further comprises adding said velocity of said accelerometer and said rotation of the earth when the earth is rotating along a same radial as the compass system and subtracting said velocity of said accelerometer and said rotation of the earth when the earth is rotating in an opposite direction as the compass system.

[c17] A compass system for a missile system comprising:
a inertial measurement unit;
a platform coupled to said inertial measurement unit

defining an x-axis, a y-axis and an xy-plane, wherein a z-axis is orthogonal to said xy-plane;

a beam rotatably coupled to said platform such that said beam rotates about said y-axis while said platform rotates about said z-axis;

an accelerometer comprising a flexure plate perpendicular to said y-axis, said accelerometer coupled to said beam a distance from said y-axis, said accelerometer generating an accelerometer signal in response to movement of said flexure plate;

an angular position sensor sensing angular position of said beam relative to said x-axis and said y-axis of said xy-plane, said angular position sensor generating an angular position signal therefrom; and

a processor receiving said accelerometer signal and said angular position signal, said processor leveling said platform with respect to local earth gravity, said processor further rotating said beam such that said accelerometer reads a sum of a velocity of said accelerometer and a rotation of the earth, said processor generating a sinusoidal signal of a rotating acceleration of said accelerometer due to said sum of said velocity of said accelerometer and said rotation of the earth, said processor reading a positive peak and a negative peak within said sinusoidal signal, and said processor generating an earth rate direction signal in response to said positive

peak and said negative peak, said processor generating an East-West signal in response to said earth rate direction signal.

[c18] The system of claim 17, wherein said angular position sensor comprises a synchro, a resolver, or a shaft angle reader reading a position of said platform and generating an angular reference output signal therefrom.

[c19] The system of claim 17, further comprising an actuator receiving processor signals and activating missile or vehicle control devices to rotate said platform in response thereto.

[c20] The system of claim 17, wherein said processor generates an angle readout valid signal in response to said East-West signal thereby initializing the compass system and signaling that the compass system is reading direction with a substantial degree of accuracy.